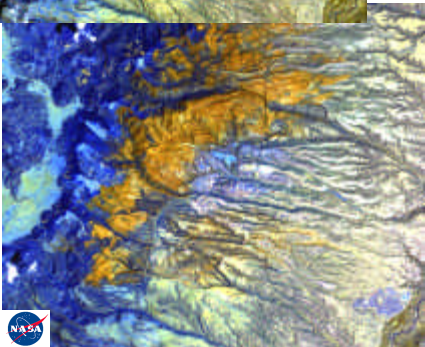
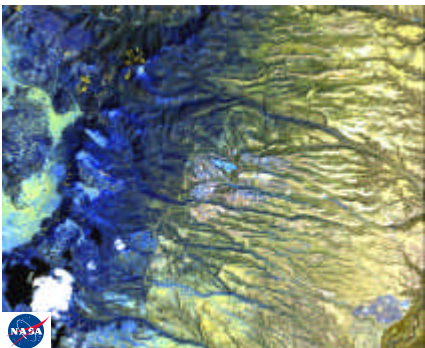
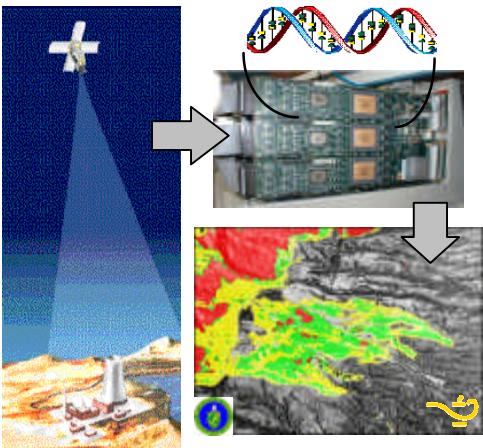


Development of a Post-Cerro Grande Fire Land Cover Map



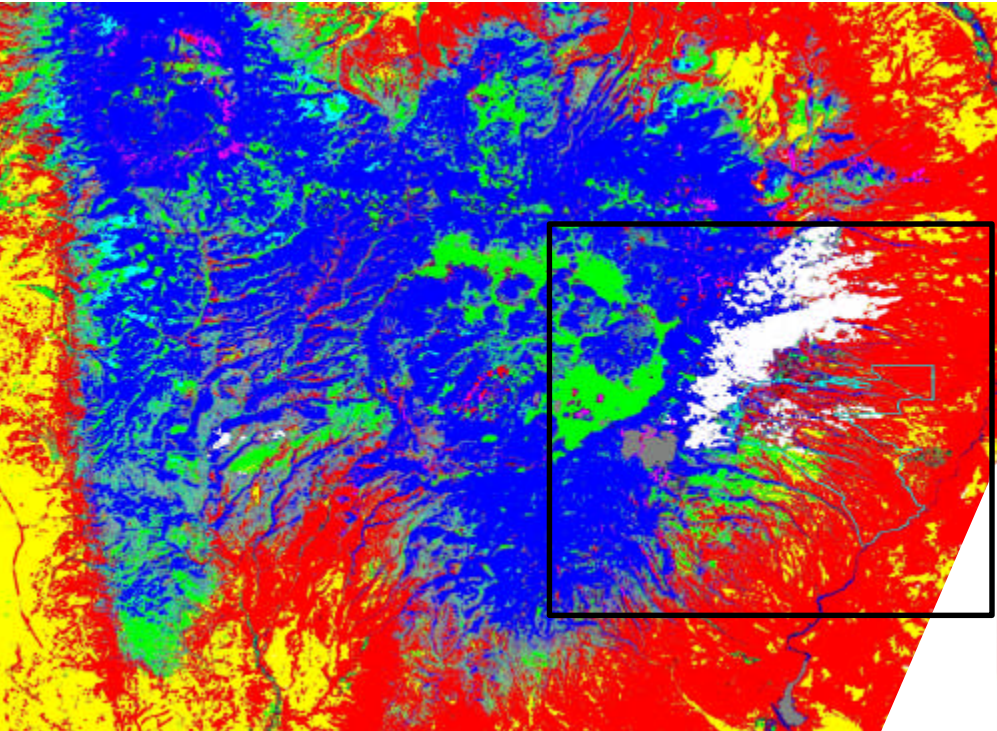
Between May 6 and May 18, 2000, the Cerro Grande wildfire burned 42,858 acres (17,344 ha) and 235 residences in the town of Los Alamos, NM. Initial estimates of forest damage included 17,059 acres (6,903 ha) of 70-100% tree mortality. Some of the affected agencies and tribes included the United States Forest Service, the Department of Energy, the National Park Service, Santa Clara Pueblo, and the Pueblo of San Ildefonso. After the fire, remote-sensing data was acquired from a variety of aircraft-based and satellite-based sensors, including Daedalus, Landsat 7, AVIRIS, and MTI, to evaluate the impacts of the fire on vegetation and soil erosion. Vegetation data was collected at 83 plots during July-September 2000 for ground-truthing. We report on the use of a newly-developed software program, GENIE, to process imagery from a variety of sources to produce a post-fire land cover classification map for Los Alamos.

Landsat 7 ETM+ Multispectral imagery. Above: July 1, 1999. Below: July 17, 2000. The burn region (brown) stands out clearly in these false-color thermal/infrared/visible images. Spatial resolution is approximately 30m.



GENIE is a software system for rapidly evolving image-processing algorithms. With current sensor platforms collecting a flood of high-quality data, automatic feature extraction (AFE) has become a key to enabling human analysts to keep up with the flow. GENIE uses an evolutionary computational approach to produce AFE tools for broad-area features in multispectral imagery. The software features an interactive graphical user interface, and a parallel/scalable processing backend. GENIE was invented for the Rapid Feature Identification Project (RFIP), a project of LANL Nonproliferation and International Security Division.

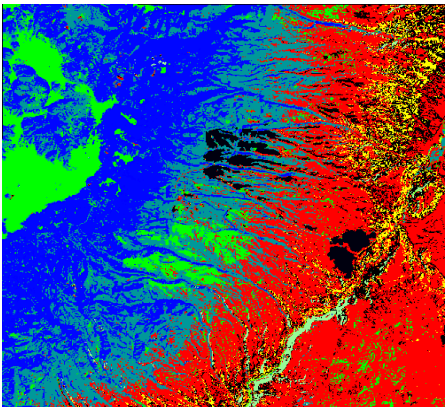
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(1) NIS-2 Space and Remote Sensing Sciences Group (2) ESH-20 Ecology Group, Los Alamos National Laboratory



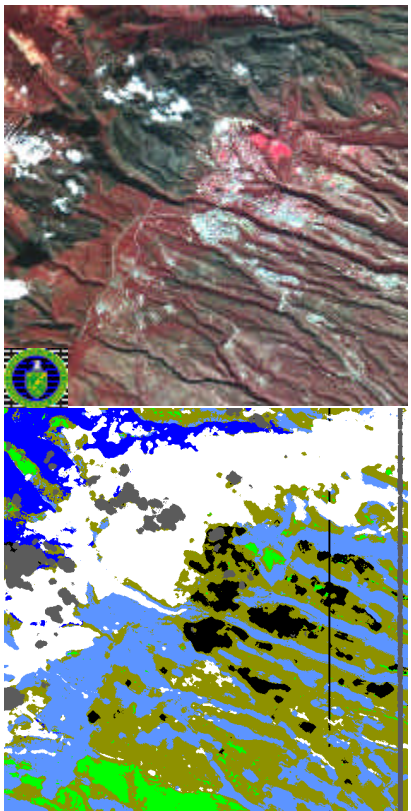
GENIE land-cover map, developed from pre- and post-fire, Landsat 7 ETM+ multispectral imagery, and existing and new field data. The large area covered will assist a number of multi-agency task groups, including habitat studies, and watershed management.

Map Key and Estimated Burn Damage : We overlay the Genie-evolved high/medium severity burn region on the 1997 land-cover map to estimate loss by land cover class.

Map Key and Estimated Burn Damage:			
Land Cover Class	Key	Burn %	Burn acres
Wildfire Damage	White		
Forest: Mixed Conifer	Blue	46	12000
Forest: Ponderosa Pine	Blue	46	12000
Piñon/Juniper	Red	5	1300
Grassland	Green	3	700
Sparse Vegetation	Yellow		
Developed	Black		
Clouds/Shadows	Grey		



1997 Land-cover map, based on Landsat 5 TM multispectral imagery from Aug 1992 (analysis by S. Koch).



GENIE land cover mapping with MTI
The DOE's Multispectral Thermal Imager (MTI) satellite has collected several post-fire images of Los Alamos (Top). GENIE's supervised classification using MTI imagery (Bottom) shows broad agreement with the pre-fire map. In particular, GENIE has used the 15 bands of MSI data provided by MTI to successfully separate mixed conifer forest (dark blue) from Ponderosa pine forest (light blue). Also noticeable is the classification of pre-fire forest pixels that suffered low severity burn as open ground (olive green) in the land cover map. Burn area is marked in white, and developed region marked in black. Clouds appear masked out in gray.